

CLAIMS

1. A paint delivery and application system, comprising:
a paint supply switching device (20) including at least two sources of
5 paint;
at least two paint cannisters (34, 36);
a paint applicator (30);
a first pair of separate supply lines (38, 42) connecting said paint supply
switching device (20) and said paint cannisters (34, 36);
10 a pigging element movable in each of said first pair of supply lines
between a first station (46) adjacent said paint supply switching device (20) and a
second station (54) adjacent one of said paint cannisters (34, 36);
a second pair of separate supply lines (40, 44) connecting said cannisters
(34, 36) to said paint applicator (30); and
15 a pigging element in each of said second pair of separate supply lines
(40, 44) movable between a first station (46) adjacent one of said paint cannisters (34,
36) and a second station (54) adjacent or within said paint applicator (30);
whereby a first paint may be delivered from a first of said paint
cannisters (34, 36) to said paint applicator (30) while a second paint is delivered from
20 said paint supply switching device (20) to a second of said paint cannisters.

2. The system as defined in Claim 1, wherein said second of said paint
cannisters (34, 36) is electrically isolated from said paint applicator (30) when said
second paint is delivered from said paint supply switching device (20) to said second of
25 said paint cannisters and/or said paint supply switching device (20) is electrically
isolated from said first of said paint cannisters (34) when said first paint is delivered
from said first paint cannister to said paint applicator (30)..

3. The system as defined in Claim 2, wherein movement of said pigging
30 element between said second station (54) adjacent or within said paint applicator (30)
and said first station (46) adjacent one of said paint cannisters (34, 36) electrically
isolates said paint cannister from said paint applicator.

4. The system as defined in any preceding claim, wherein said first stations (46) are a trunk line communicating with one of said supply lines (38-44) receiving said pigging element and permitting paint to flow past said pigging element until released in said supply line.

5. The system as defined in any preceding claim, wherein said system includes a source (60) of solvent under pressure and a solvent supply line (61) connected directly from said source of solvent to said applicator (30) for flushing said applicator.

6. The system as defined in any preceding claim, wherein said second pair of separate supply lines (40, 44) each include at least two pigging elements having solvent therebetween, thereby flushing said second pair of separate supply lines and said applicator (30) with solvent.

7. The system as defined in any preceding claim, wherein said paint applicator (30) is located in a paint spray booth and said paint cannisters (34, 36) and said paint supply switching device (20) are located outside said paint spray booth.

8. The system as defined in any of Claims 1 to 6, wherein said paint applicator (30) is located in a paint spray booth, said paint applicator is a robotic paint applicator and said paint cannisters (34, 36) are located on said robotic paint applicator.

9. The system as defined in any preceding claim, wherein said system includes a control module (110) delivering said first paint from said paint supply switching device (120) to said first of said paint cannisters (134) through a first supply line (138) of said first pair of supply lines, then upon delivery of substantially all of a predetermined quantity of said first paint to said first of said paint cannisters (134), said control module (110) releasing one of said pigging elements into said first supply line under pneumatic pressure, thereby delivering a remainder of said first paint to said first

of said paint cannisters and electrically isolating said first of said paint cannisters from said paint supply switching device.

10. The system as defined in any preceding claim, wherein said paint
5 cannisters (34, 36; 134, 136) each include a reciprocal piston (37, 137) which retracts upon filling said paint cannisters and paint in said paint cannisters is then driven to said paint applicator (30, 130) by extending said piston.

11. The system as defined in claim 10, wherein said piston (37, 137) is
10 driven by dosing means comprising an electric motor and/or a servo drive.

12. The system as defined in Claim 9, wherein said control module (110)
then delivers said first paint under pressure from said first of said paint cannisters (134)
to said paint applicator (130) and simultaneously delivers said second paint from said
15 paint supply switching device (120) to said second of said paint cannisters (136) while
said second of said paint cannisters is electrically isolated from said paint applicator.

13. The system particularly as defined in Claim 1, comprising:
a source (120) of paint under pressure;
20 a paint cannister (134) having a piston (137) reciprocable therein;
a paint applicator (130);
a first delivery line (138) between said source (120) of paint under
pressure and said paint cannister (134) adapted to deliver paint from said source of
paint under pressure to said paint cannister;
25 a second delivery line (140) between said paint cannister (134) and said
paint applicator (130) adapted to deliver paint from said paint cannister to said paint
applicator;
a first pig station (162) communicating with said second delivery line
(140) adjacent said paint cannister (134);
30 a second pig station (164) communicating with said second delivery line
(140) adjacent or within said paint applicator (130);

at least one pigging element movable in said second delivery line (40) between said first pig station (162) and said second pig station (164); and

a source (172) of solvent under pressure communicating with said second delivery line (140) adjacent or within said paint applicator (130);

5 whereby, paint is delivered from said source (120) of paint under pressure to said paint cannister (134) upon retraction of said piston (137) in said paint cannister, paint is delivered to said paint applicator (130) upon extension of said piston in said paint applicator and a predetermined volume of solvent is delivered to said supply line (140) from said source (172) of solvent under pressure upon retraction of
10 said piston in said paint cannister following delivery of paint to said paint applicator.

14. The system as defined in Claim 13, wherein said second delivery line (140) includes two pigging elements (166, 168) and said source (172) of solvent under pressure is connected to said second pig station (164) to deliver solvent between said
15 pigging elements.

15 A method of delivering and applying paint to a substrate using a paint delivery and application system including a paint supply switching device (20) having at least two sources of paint under pressure, at least two paint cannisters (34, 36), a
20 paint applicator (30), a first pair of separate supply lines (38, 42) connecting said paint delivery and switching device and said paint cannisters, and a second pair of separate supply lines (40, 44) connecting said paint cannisters to said paint applicator, said method comprising the following steps:

25 directing a first paint under pressure from said paint supply switching device (20) to a first of said paint cannisters (34, 36);

 directing said first paint from said first of said cannisters (34, 36) to said paint applicator (30), thereby delivering said first paint to said substrate;

 delivering a second paint under pressure from said paint supply switching device (20) to a second of said paint cannisters (34, 36); and

30 moving at least one pigging element through each of said supply lines (38-44) respectively between a first station (46) adjacent said switching device (20) and a second station (54) adjacent one of said cannisters (34, 36) and between a first station

(46) adjacent one of said cannisters (34, 36) and a second station (54) adjacent or within said paint applicator (30).

16. The method as defined in Claim 15, wherein said method includes
5 electrically isolating said second of said paint cannisters (36) from said paint applicator (30) when said second paint is delivered from said paint supply switching device (20) to said second of said paint cannisters.

17. The method as defined in Claim 15 or 16, wherein said method includes
10 electrically isolating said first of said paint cannisters (34) from said paint supply switching device (20) as said first paint is directed from said first of said paint cannisters to said paint applicator (30).

18. The method as defined in any of claims 15 to 17, wherein said method
15 includes delivering solvent under pressure directly to said paint applicator (30) from a source (60) of solvent under pressure following delivery of said first paint to said paint applicator.

19. The method as defined in any of claims 15 to 18, wherein said paint
20 cannisters each include a reciprocable piston (37), said method including directing said first paint under pressure to said first of said paint cannisters (34), and retracting said piston (37), thereby at least partially filling said first of said paint canisters, then extending said piston to drive said first paint to said paint applicator (30), and
delivering said second paint to said second of said paint cannisters (36),
25 thereby at least partially filling said second of said paint cannisters and retracting said piston (37), then extending said piston to drive said second paint to said paint applicator (30).

20. The method as defined in any of claims 15 to 19, wherein said second
30 pair of separate paint lines (140, 144) each include at least two pigging elements, said method including delivering solvent between said pigging elements and driving said

paint and said pigging elements to said paint applicator (130), thereby flushing said second pair of separate supply lines and said applicator with solvent.

21. The method as defined in Claim 19 or 20, wherein said second pair of
5 separate supply lines (40, 44) each include a pigging element, a first pigging station (46) adjacent said paint cannister (34, 36) and a second pigging station (54) adjacent or within said paint applicator (30), said method including driving said pigging element from said second pigging station (54) to said first pigging station (46), thereby driving remaining paint in said second pair of supply lines to one of said paint cannisters (34,
10 36) and retracting said piston (37), then extending said piston to drive said remaining paint to said paint supply switching device (20).

22. The method as defined in claim 15, comprising:
delivering a predetermined quantity of a first paint from said paint
15 supply switching device (20) to said first of said paint cannisters (34) through a first supply line (38);

releasing a first pigging element under pneumatic pressure into said first supply line, thereby delivering a remaining predetermined quantity of said first paint to said first of said paint cannisters (34) and electrically isolating said first of said paint
20 cannisters from said paint supply switching device (20);

delivering a predetermined quantity of said first paint under pressure from said first of said paint cannisters (34) to said paint applicator (30);

releasing a second pigging element into a second supply line (40) under pressure, thereby delivering a remaining predetermined quantity of said first paint in
25 said first of said paint cannisters (34) to said paint applicator (30) and applying said first paint to a substrate; and

delivering a second paint from said paint supply switching device (20) to said second of said paint cannisters (36) through a third supply line (42) while said second of said paint cannisters (36) is electrically isolated from said paint applicator.

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23. The method as defined in Claim 22, wherein said method further includes releasing a third pigging element into said third supply line (42) under

pneumatic pressure, thereby delivering a predetermined quantity of said second paint to said second of said paint cannisters (36) and electrically isolating said second of said paint cannisters from said paint supply switching device (20).

5 24. The method as defined in Claim 22 or 23, wherein said method further includes in sequence driving said second paint from said second of said paint cannisters (36) to said paint applicator (30) through a fourth supply line (44) while said second of said paint cannisters (36) is electrically isolated from said paint supply and switching device (20) and releasing a fourth pigging element into said fourth supply line (44)
10 thereby delivering a remaining quantity of said second paint from said second of said paint cannisters to said paint applicator (30) and applying said second paint to a substrate.

 25. The method of as defined in any of claims 15 to 24, wherein said paint
15 supply and switching device (20) includes a source of solvent under pressure and said method further includes delivering solvent under pressure to said paint applicator (30) through said first and second supply lines (38, 40) following delivery of said first paint through said paint applicator to a substrate.

20 26. A method of delivering a predetermined volume of solvent to a paint delivery and application system having at least one paint cannister (134) receiving paint from a source (120) of paint under pressure including a piston (137) reciprocating therein, a paint applicator (130), a delivery line (140) between said paint cannister (134) and said paint applicator and a source (172) of solvent under pressure connected
25 to said delivery line (140) adjacent or within said paint applicator (130), particularly as defined in any of claims 15 to 25, said method comprising the following steps:

 delivering a predetermined volume of paint from said source (120) of paint under pressure to said paint cannister (134) while withdrawing said piston (137) ;
 extending said piston (137) and driving paint from said paint cannister
30 (134) to said paint applicator (130) through said delivery line (140) and creating a continuous stream of paint between said paint cannister and said paint applicator; and

delivering solvent under pressure to said delivery line (140) adjacent or within said paint applicator (130) while withdrawing said piston (137) in said paint cannister (134), thereby delivering said paint and said predetermined volume of solvent to said delivery line (140), wherein the volume of solvent delivered to said delivery line is determined by the distance said piston (137) is withdrawn in said paint cannister (134).

27. The method as defined in Claim 26, wherein said method includes continuing to withdraw said piston (134) in said paint cannister to deliver said predetermined volume of solvent at least partly to said paint cannister (134).

28. The method defined in Claim 26 or 27, wherein said paint delivery and application system includes a pigging element (166) in said delivery line (140), said method including extending said piston (137) to deliver said paint and said pigging (166) element to said paint applicator (130) then delivering solvent to said delivery line (140) adjacent or within said paint applicator and withdrawing said piston (137) to deliver paint remaining in said delivery line (140) to said paint cannister (134), said solvent driving said pigging element (166) to said paint cannister (134).